

The book which I sent in the form of a paper for publication is a small bit of what we have working on since last 32 years. When I say we I mean myself my wife Dr. (Mrs) S. Ranyanyaki D. Sc. and a group of our research assistants and students.

All preparations, may these be preparation of organic or inorganic substances or at that have uses of food, appear all alike if not properly understood. ~~I say the method of the Organic molybdenum microstiches is about which the paper is concerned.~~ The ^{sterile liquid organ} mixture in which these microstiches are synthesized consists of ~~strictly~~ chiefly of ammonium molybdate, diammonium hydrogen phosphate biological minute and formaldehyde. Each one of them have been included because some definite reasons and their concentrations determined aft. - a lot of experiments to produce such particles which have some characteristic functional properties as splitting of water molecules in sunlight and fixation of molecular nitrogen and reduction of inorganic carbon into organic carbon. Apart for these, ~~these~~ ~~these~~ the particles ~~are~~ are photochemically prepared and have many

properties of biological sides. And about this & the reason for using the chemicals which Deham used I will give in reply to the ^{2nd} referee comment.

Second Referee Comments:

It is not "our claim only" that the work has been confirmed. I am herewith attaching the photocopy of Dr. M. H. Briggs' paper in "Spaceflight" reporting the confirmation of our work. He worked independently in London. This Dr. M. H. Briggs ~~was~~ is the same person who was convener of the NASA symposium on "Recent Trends in Exobiology" held in Pasadena (U.S.A.) in Feb 1963. Actually he did not believe even about our work on photochemical formation of peptide in aqueous mixtures. ~~He said it was~~ ^{For which he considered to be} "impossible and unbelievable." He said he does not believe a word of it because he believes that if peptides are synthesized in aqueous mixtures, he will think that half of the work on origin of life is done. But he will not believe it, no matter who says and does unless he does it himself. He took the method of preparing photochemical formation of peptide bonds in aqueous mixture from me and in London he repeated a number of our experiments on photochemical formation of peptides using light from a 500 watt electric bulb and he did

Observe the photochemical fixation of peptides in aqueous solution.

① Subsequently he repeats the experiment in Geem and
confirms the work. In his open letter paper ~~with~~ ~~the~~ photo-
copy of which is attached herewith he writes in the introduction:

② "More recently Borshadov & Pesti have described the fixation
of a series of cell-like microstructures (named by them SEEWANG
a Sanskrit word for 'particles of life') by the action of sunlight or
an UV lamp on sterile liquid solution containing citric acid
and a colloidal salt of molybdenum or iron. It is the
purpose of this paper to repeat a confirmation and extension of
this work."

In the conclusion he writes,

"While the definition of 'life' and 'living' is a difficult
problem, it can be said that these microscopic objects
satisfy many of the criteria of living cells. It seems
entirely probable that objects similar to those obtained in
the present experiments were ~~found~~ found in abundance
in the oceans of the primitive earth and were the
immediate precursors of the cellular life."

Please read the whole paper attached
herewith

He then stated the work on Jeerum and
 presented a paper confirming our work of Jeerum in
 the 4th International Congress of Photochemistry held at
 Oxford in August 1964. He presented some more of
 our work of Jeerum and published the work in
 Spaceflight in 1965. I am sending the photocopy
 of the work.

As you will see ^{in Tom's papers} the mixtures were ~~not~~ sealed
 not ~~not~~ in Cottont plugged and mouth covered with
~~that~~ polythene as we did to avoid the escaping
 of the CH_2O as ~~suggested by the paper~~ ^{Post} also
 used a number of other ^{non volatile} ~~organic~~ compounds. After
 the exposure the mixture is examined for sterility
 and after they are found ~~to be~~ sterilised only
 then the analysis is done. All possible precautions
 were taken ^{for sterility} and mixture remained sterilised ^{even} after the
 exposure.

Anyway this is the story of Jeerum some 20 years
 years back. In 1970 we developed our method of
 preparing the self sustaining cocoon by about
 exposure of 24 hr to sunlight or from 3 fluorescent
 rods fixed ~~at~~ ~~25~~ ^{at} 40 cm. ~~of~~ ^{of} the exposure mixture.

1
 the
 top
 pg. 3

And the formaldehyde concentration ^{was} ~~can be~~ ^{is} ~~can be~~ to
 abt 7% in the mixture which does not allow
 any Km being from to ^{with} ~~run~~ ^{in this}. The con.
 can be increased to ^{upto} 14% if desired. Then
 there is ~~enough~~ ammonium salts in the mixture to form
 hexamethylene tetra amine which being ^{very} soluble in the
 water ^{provides still} ~~has~~ ^{greater} stability. In these mixture there
 is so much CH_2O ^{even} ~~after~~ ^{completion of} ~~exposure~~ that
 can be smell for a long distance. There is no infection.

~~If it is matter~~ We then come to the factor of
 biochords in these mixture. ~~Stacy~~ ^{Stacy} ~~Amiens~~ ^{Amiens} reads fact
 has been confirmed by Prof Santamaria et al. in
 Em before that Pussensky et al
 have report that ^{ammonium} salts and CH_2O on exposure
 U.V. light form ^{for} ~~amino~~ ^{acid} ~~acid~~. They used ^{radiation} ~~clinical~~
~~U.V.~~ ^{as} ~~mercy~~ ^{source of irradiation} ~~lamp~~. If ~~analysis~~ ^{analysis} is used as
^{some} ~~source~~ ^{of} ~~exposure~~ ^{exposure} the ~~result~~ ^{result} is obtained on large exposure.
^{How} ~~the~~ ^{major} ~~part~~ ^{part} ~~is~~ ^{is} ~~to~~ ^{to} see which is the weakest source
 of energy strong enough to give the biochords of
 intact in origin of life because stronger is the source of
 energy quicker the biochords found are destroyed.
 Panamparum's synthesis of adenosine phosphates

Some
 How the major part is
 to see

(9)

He had ^{glimmer} the ~~idea~~ ^{idea} of ammonium phosphate
a case for carbon & that too after he
had the procedure of production of Zeeman in
which the ~~idea~~ channels are used but
that was not as source of irradiation.

Uses ammonium phosphate and formaldehyde. He
 again used that refer to U.V. ~~and~~ ^{and} this the
 same same of energy he has ~~referred~~ ^{referred} the ~~fact~~
 of oxygen for a mixture of CH_2O and Calcium ~~and~~
~~hydroxide~~. If you look at the composition of mixture
 it has ammonium ~~and~~ phosphate and formaldehyde,
 and also biological minerals which include magnesium
 and calcium. Only this work on green in done
 earlier and the other obstacles came afterwards,
 This in a way forms why we have been using the
 constituents of an ~~open~~ mixture for the production
 of organic molybdenum mixtures. We use molybdenum
 because of its unique catalytic activity both ⁱⁿ living
 tissues and out side ^{di} ammonium ^{hydroxy} phosphate to
 produce molybdenum and necessary phosphate, formaldehyde
 because it is easily formed ~~and~~ by the action of U.V.
 on aqueous solution of carbon dioxide ^{provides essential element} and now it is my
 well known that CH_2O is fundamental in interstellar space
 in my galaxies of pure CH_2O . ~~But~~ We used
 biological mixtures because we ~~thought~~ ^{thought} that ~~it~~ ^{it} was

~~to~~ these moulds are needed in the by the part
 day cells may be there have some catalytic
 function ~~in~~ ^{either in} light the abrogation of the biochem
 of intact in original life ~~or~~ on the organization
 of the material in specific dense patterns ^{to begin with} which
 has properties in a new dimension, the product of
 life, which was not present in ^{any} of the constituent
 compounds individually.

^{The organs molybdenum mentioned above in the paper}
~~These pedicles have found ways of internal obstruc-~~
~~I am now with reading a micrograph] ~~the~~ The~~
^{which carries the gelatin sand by the first region.}
^{of the pedicles are} walls ~~of~~ ^{and} semipermeable and the molecules
 of the medium into the pedicles passing through
 the ~~outer~~ wall and when they reach the
^{about part of the necessary substrate molecules & need oxygen}
 central portion they synthesize the material part
 As the pedicles grow big in size the weaker
 parts of the membrane buldges out and
 in the form of a bud, which ^{feels} pleases to grow big and
^{of myximum speed & hydrogen} then ^{of separated} separates out. The point of contact is
 sealed as in every self sealing membrane.

To begin with certainly the peloids are found spontaneously then ^{and finally, at last} appear in number by budding takes place. ~~For it seems you have seen~~

The feculae are not crystalline or crystals, In X-ray diffraction they appear quite ~~amorphous~~ amorphous. ~~The~~ Crystals do not have bony wall and internal structure.

The fixation with chromic acid is an ^{usual} ~~whole~~ process of fixation in cytology. and I agree that the yellow colour of the peloids may in all probability be due to the ~~fact~~ of an oxidized form of wolfrum complex. The ~~important~~ ^{important} ~~point~~ thing about the staining are (a) to show that the biochemicals which are detected by chemical tests are also locatable at different local by staining. (See Briggs's paper of which the photocopy is attached)

(b) ~~The another~~ I agree that staining by a particular biological stain does not necessarily

for the [unclear]

3. 1. 1. 1.

2. The plates on the [unclear] & [unclear]
to [unclear] [unclear] [unclear].
[unclear] [unclear] [unclear].

4. [unclear] [unclear] [unclear]

a source of nitrogen carbon as CO_2 or carbonic acid,
 when we found ⁱⁿ organic carbon we wanted
 to know ~~whether~~ ^{whether the} ~~the~~ ^{organic} nitrogen in carbon is because of the
 release of nitrogen carbon as the organic carbon is
 coming from some other source. For ^{this} we found
 a collaborator with Dr. A. Smith of AMES Research Center
 Moffett Field, California and Dr. C. Peterson of Hawaii University.
 It has been shown that if $\text{H}^{14}\text{CO}_3^-$ ~~carbon~~ is used as
 source of nitrogen carbon has ^{14}C ~~the~~ after uptake of the
 mixture ^{14}C is from the organic material found in the
 mixture than by indicating that fixation of carbon is taking
 place in the mixture. The work was published in *Exposition*
 and a photocopy of the paper is attached here.

In the point to the referee has asked us
 how is it that though the method of procedure has
 changed ~~from~~ ^{the} the beginning of the paper in
 1963 the procedure on the same. The comparison has
 changed ~~from~~ ^{the} the beginning ~~to~~ ^{today} but it
 is for the purpose of particles, which have ~~the~~ ^{the} purpose
 of biological order and not for fixation of N_2 or CO_2
 and particularly C_2H_4 or water. These particles are about
 in only ~~the~~ ^{the} molecular based particles ~~and~~ ^{not} ~~total~~.

The whole thing is like the jeans we first found in
 mixture which show photolysis of proteins as
 amino acids, peptides, sugar etc. ~~then~~ Briggs
 reported these results. Then I found jeans may
 be the thermal peptides of Dr. S. W. Fox (). These jeans
 were found by the couple produced by the action of thermal peptide
 + osmium tetroxide. ~~to~~ Amino alcohol, ascorbic acid
 thermal peptide + biological material were used in this experiment.
 These also gave microtubes with hard wall and internal
 structure which grow for within, multiply by budding
 and have metabolic activity. These are the basic properties
 which we ~~found~~ ^{were seeking in} these peptides.

After the Briggs' confirmation we started preparing
 such peptides with materials which are not found in living
 cells. These were two objectives in doing these experiments.
 The first was to show beyond doubt that there are
 not terrestrial infections and secondly that our
 conclusion is that such peptides which grow for
 within, multiply by budding and have metabolic
 activity and have hard wall and internal
 structure can be produced from a variety of material.
 We hold that ~~life~~ matter has two

properties due to which life could originate on the earth. One is that ~~the~~ matter has inherent property of duplication under suitable conditions and the ~~other~~ second one is that a system of matter in equilibrium has inherent property of adaptability. (P.M. 1924). ^{the} ~~the~~ ^{main} ~~main~~

Quantum mechanical resonance of valence electrons and La Chester's principle are the express of these properties.

So to us it was very important that we should be able to produce such microstructures with body wall and internal structure which ~~should~~ ^{should} show the properties of growth from within, multiplication by budding and have metabolic activity. And we did produce such particles one with help of putting of Copper (Zn) ~~and~~ also with called Copper Jean, and also Cobalt Jean, Cobalt Jean, Nickel Jean and so on. So we think that ~~the~~ like Colloid, Coacervate etc it is ~~an~~ state of organization which put the molecules of a few substances in such close contact that it has body wall or internal structure and in specific amounts some of these may show the properties of biological order. How all the

takes up deep in the problem of origin of life and therefore
 connection it has with the part which that a type of
 such peculiar ~~photo~~ ^{program} ~~structure~~ of the action of light
 on a mixture of simple organic nitrogen substances has
~~strong~~ ^{strong} inhibiting ability of splitting water in sulfur and
 while the ~~the~~ H_2 thus set free for the fixation
 of N_2 and CO_2 .

So you will see that these ~~prop~~ peculiar are
 not seen in properties of splitting water in light.
 The ability of splitting water in light is only ~~the~~ what
 may be called as Molybdenum green. These peculiar
 are property of the action of light on standard organic mixture
 of common molybdenum, diuran-hydrogen phosphate, biological
 mineral and CH_2O . The concentration of CH_2O in this is
 about 7% and ~~the~~ this are found within $\$ 3510$ days
 of exposure to sunlight for 8 hr. a day each day and
 there is eight of CH_2O left in them even after completion
 of the exposure. These peculiar are responsible for the
 photosynthetic electron machine (PEM) ~~and~~ ^{and} ~~in~~ ⁱⁿ property
 of splitting of water in sunlight and the paper concerns
 these peculiar only.

and ~~also~~ if this property is strong as in some
 modified Molybdenum Green, the decrease in the pressure
 takes place as soon as the mixture is exposed to
 light in Warby's apparatus. If this nitrogen fixation
 ability is poor in a sample inorganic in the presence of
 the Warby's flask is obtained in daylight ~~due to the effect of~~
 the first case the increase in pressure is caused by
 the splitting of water by the splitting of heat molecules
 in sunlight is less than the decrease in pressure caused
 by the fixation of N_2 and in the second case the
 increase in pressure is due to splitting of water is more than
 the decrease in pressure caused by the fixation of nitrogen.

~~Has as the result~~ It has been further observed
 that in this mixture splitting of water is photochemical and
 atomic hydrogen is formed. The fixation of N_2 of this
 hydrogen is ionic & takes place in presence of Green acting
 as nitrogenase and the reaction is independent of light.

I can include whatever portion of this reply you wish to be
 incorporated ~~in your paper~~ ^{in your paper} I hope I
 have been able to answer your queries. I shall be thankful if
 you send the paper for publication.